

Project Profile: Fair Oaks Farms



Highlights

- Produces compressed natural gas (CNG) to fuel tractor trailers that deliver milk
- Generates renewable energy to power the buildings and machines on the farm
- Attracts more than 500,000 visitors yearly to its agricultural science center, the Adventure Farm
- Nutrient recovery generates high-quality fertilizer for use on the farm

Benefits



Learn how this project advances sustainability in many ways.

Powering a fleet of vehicles using biogas from cow manure is the sustainability apex for dairy farms. Fair Oaks Farms in Indiana has been doing it since 2008. The farm, made up of 12 family-run dairies with 36,000 cows, sends much of the manure produced on site to an anaerobic digester where biogas is produced and further refined to compressed natural gas, fueling the farm's 42 milk trucks. Fair Oaks Farm is a model for sustainable dairy farming across the country and world — turning waste into biogas, protecting the health of the land through innovative nutrient management, and educating the public about sustainable food production.

Sustainability isn't just something we claim, it's how we live.

– Mike and Sue McCloskey, Fair Oaks Farms

Powering Farm Transportation Vehicles from Manure

Focused on creating a zero-carbon footprint dairy farm, the farm's owners Sue and Mike McCloskey invested in technology to convert the biogas into compressed natural gas (CNG). They partnered with RUAN Trucking to provide fuel for the farms' 42 milk trucks. Every day, the trucks deliver milk to processing plants hundreds of miles away in Indiana, Kentucky, and Tennessee. The trucks fuel up at the CNG station on the farm or at the CNG station at the state border between Indiana and Kentucky.

The farm has reduced its use (and associated costs) of diesel fuel by more than 2 million gallons per year. The surplus clean biogas is piped and sold to a CNG fueling station.



Using CNG-fueled vehicles has replaced the use of diesel fuel-powered vehicles. Photo Credit: Ryan Donnell, [Fortune](#)

In addition to CNG, the biogas produced from the digesters is used to generate electricity, which powers all of the farm's buildings and machines.

Improving Nutrient Management Practices

Prairie's Edge Dairy Farm, a founding member of Fair Oaks Farms, also recovers nutrients by processing its anaerobically digested manure. In April 2015, Prairie's Edge Dairy Farm installed the [Trident Nutrient Recovery System](#). In the first stage separation, the system conditions the feedstock and removes the large fiber. The organic fiber is then dewatered and reused as high-quality bedding or organic soil amendment. In the second step, the remaining fine solids containing the nutrients are isolated through polymerization and micro-infused air flotation and then further dewatered. The concentrated nutrients are used for direct land application or as feedstock for commercial fertilizer production. The nutrient-depleted water is used for irrigation. Trident's system has resulted in a significant reduction of the farm's manure management costs. The improved nutrient management process ensures that the Fair Oaks Farms soil remains healthy for future generations.



Dissolved Air Flotation (DAF) system.
Photo Credit: Newtrient Case Study



Moving disk press.
Photo Credit: Newtrient Case Study

Dairy Education Center


Co-owners Mike and Sue McCloskey are committed to providing a look into how the farm operates sustainably, so much so they decided to open their doors to the public with a state-of-the-art agricultural science center ("dairy theme park"). First opening in 2004, the agricultural science center now attracts more than 500,000 people annually. Visitors can participate in bus tours of the dairy and swine operations, engage in hands-on interactive exhibits about farming, visit the cheese factory, and eat farm-produced food in the on-site restaurant and café.



Benefits


Fair Oaks Farms advances sustainability in the following ways:

PEOPLE




- Using CNG and reducing use of diesel fuel can improve local air quality, improving public health
- “Agro tours” provided by the agricultural science center inspire participants to learn about anaerobic digestion and biogas energy
- Visitors engage in hands-on, interactive exhibits to learn about where their food comes from and how it’s produced

PLANET



- Reduces the use of 2 million gallons of diesel fuel annually
- Use of manure-derived fertilizer reduces dependence on petrochemical fertilizers, which are made from non-renewable sources
- Protects local water resources by reducing nutrient run-off and destroying pathogens

PROFIT



- Reduces operating costs at the farm by producing energy and generating heat and hot water, which reduces reliance on utilities
- Generates enough renewable energy to power all buildings and machines on the farm
- Manure treatment and nutrient application complies with manure management regulations, saving additional investment

About the Digesters

Prairie’s Edge Dairy Farm has two anaerobic digesters on site: a large DVO two-stage mixed-plug flow™ and a smaller vertical-plug flow. The dairy maintains approximately 36,000 lactating cows producing manure that feeds the anaerobic digesters.

The DVO two-stage mixed-plug flow, which began operating in 2008, receives manure from about 9,000 dairy cows each day. Biogas is used for on-farm electricity generation, with waste heat from the genset used to heat the digester. This system is also equipped with a gas cleaning system that scrubs contaminants from the biogas to produce CNG that meets purity levels for use as a renewable transportation fuel.

The vertical-plug flow digester began operating in 2003. It receives manure from about 3,000 dairy cows each day and is equipped with two 350 kilowatt (kW) gensets. This system produces electricity for on-farm use, and any excess electricity produced is used at the dairy visitor center and other buildings at the farm. Waste heat from the genset is recovered and used to heat the digester.



Biogas is updated to 99% methane for use as vehicle fuel.
Photo Credit: Ryan Donnell, [Fortune](#)

SYSTEM DESIGN PROPERTIES	
Digester type	DVO Two-Stage Mixed Plug Flow
Population Feeding Digester	9,000+ Dairy
Baseline System	Storage Tank or Pond or Pit
System Designer	DVO, Inc.

SYSTEM DESIGN PROPERTIES	
Biogas Use	Cogeneration; CNG for Vehicle Fuel
Biogas Generation	200,000 ft ³ /day
Generation Capacity	1,060 kW
Receiving Utility	Jasper County REMC
Digester type	Vertical Plug Flow
Population Feeding Digester	3,000 Dairy
Baseline System	Storage Tank or Pond or Pit
System Designer	Environmental Energy Corporation
Biogas Use	Electricity
Total Capital Cost	\$12 million
System Financing	The farm financed about 99 % of the up-front capital cost of the anaerobic digester using industrial revenue bonds, with a loan period of 15 to 20 years
O&M costs (two-stage mixed plug flow digester)	Estimated at \$600,000 per year
O&M costs (vertical plug flow system)	Estimated at \$100,000 per year

Want to learn more?

For more information about Fair Oaks Dairy, visit its website at <http://fofarms.com/>.

Read about the [“Longevity Award”](#) from the American Biogas Council in 2016 for biogas systems that have been continuously operating for more than 5 years.

Visit Trident Processes’s website for information about its nutrient recovery system at Fair Oaks, including a [2016 case study](#) and [videos](#).

Learn more about [Select Milk Producers, Inc.](#)

Review a [Fortune magazine](#) article about Fair Oaks Farms.

